

WHAT IS CLAIMED IS:

1. A make-up control system for creating a threaded connection between a first tubular and a second tubular  
5 comprising:

a top drive connected to the first tubular;

10 a controller operably connected to the top drive that sends at least one command signal to the top drive, the top drive generating a torque and a rotational speed in response to the at least one command signal, the torque and rotational speed being applied to the first tubular during a make-up process between the first and second tubulars,

15 wherein the top drive generates at least one of either a torque or turn feedback signal that is transmitted to the controller, and wherein the controller monitors the at least one feedback signal to determine at least one of either the torque or number of turns that are applied to the first tubular during the make-up process, and

20 wherein the controller halts the make-up process when one of either a predetermined torque or turn limit is reached.

2. The system of claim 1, wherein the top drive is an electric motor.

25 3. The system of claim 1, further comprising a motor controller operably connected to the motor, wherein the motor controller controls the rotational speed that the top drive imparts on the first tubular by controlling an amount of voltage that is applied to the top drive.

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35 4. The system of claim 1, further comprising a motor controller operably connected to the top drive, wherein the motor controller controls the torque that the top drive imparts on the first tubular by controlling an amount of current that is applied to the top drive.

5. The system of claim 1, further comprising a motor controller that controls a predetermined maximum allowable torque limit that may be applied to the first tubular.

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6. The system of claim 1, further comprising a turn encoder that monitors an amount of rotation of the first tubular during the make-up process and generates a turn feedback signal and transmits the turn feedback signal to the controller.

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7. A method of using a top drive in a make-up process to create a threaded connection between a first tubular and a second tubular comprising the steps of:

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providing a top drive;

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connecting the first tubular to the top drive;

operably connecting a controller to the top drive;

transmitting command signals from the controller to the top drive;

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generating a torque and a rotational speed in the top drive, in response to the command signals, and applying the torque and rotational speed to the first tubular through the top drive during a make-up process between the first and second tubulars;

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transmitting at least one of either a torque or turn feedback signal from the top drive to the controller, wherein the controller uses the feedback signal to monitor at least one of either the torque or number of turns that are applied to the first tubular during the make-up process; and

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setting at least one predetermined torque or turn limit in at least one of phase of the make-up process, such that the controller sends a command to the top drive to halt the make-up process when any of the at least one predetermined torque or turn limits are reached.

8. The method of claim 7, wherein the top drive is an electrical motor.

9. The method of claim 7, further comprising the step of  
5 providing a motor controller operatively connected to the top drive.

10. The method of claim 7, further comprising the steps of:

10 controlling the rotational speed that the top drive imparts on the first tubular by controlling an amount of voltage that is applied to the top drive; and

15 controlling the torque that the top drive imparts on the first tubular by controlling an amount of current that is supplied to the top drive.

11. The method of claim 7, further comprising the step of obtaining torque versus turns data during the make-up process and analyzing the data to determine if the threaded connection  
20 between the first and second tubulars is a proper connection.

12. The method of claim 7, further comprising a thread matching phase, which comprises the step of aligning a threaded portion of the first tubular for threading engagement with a  
25 threaded portion of the second tubular.

13. The method of claim 12, further comprising an initial threading phase, which comprises the steps of:

30 setting a predetermined initial threading phase torque limit;

monitoring the amount of rotation of the first tubular; and

monitoring the torque applied to the first tubular,  
wherein the initial threading phase is complete when the first

tubular has been rotated by a predetermined amount without exceeding the initial threading phase torque limit.

14. The method of claim 13, further comprising a main  
5 threading phase, which comprises the steps of:

increasing the speed of rotation of the first tubular;  
and

increasing the initial threading phase torque limit to  
a main threading phase torque limit.

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15. The method of claim 14, wherein the main threading  
phase is complete when the controller detects a decrease in the  
speed of rotation of the first tubular coupled with the torque  
applied to the first tubular approaching the main threading  
15 phase torque limit.

16. The method of claim 15, further comprising a final  
threading phase, which comprises the steps of:

decreasing the speed of rotation applied to the first  
20 tubular below the speed of rotation set during the main  
threading phase; and

increasing the main threading phase torque limit to a  
final threading phase torque limit.

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17. The method of claim 16, wherein the final threading  
phase is complete when the final threading phase torque limit  
has been reached.

18. The method of claim 17, further comprising a  
30 tightening phase, which comprises the steps of:

setting a final torque limit; and  
incrementally increasing the final threading phase  
torque limit until the final torque limit is reached.

19. The method of claim 18, wherein the tightening phase is complete when the torque that is applied to the first tubular reaches the final torque limit and rotating ceases.

5        20. A method of using a top drive in a make-up process to create a threaded connection between a first tubular and a second tubular comprising the steps of:

          providing a top drive;

          connecting the first tubular to the top drive;

10        operably connecting a controller to the top drive;

          transmitting command signals from the controller to the top drive;

15        generating a torque and a rotational speed, in response to the command signals, that are applied to the first tubular by the top drive during a make-up process between the first and second tubulars;

20        transmitting at least one of either a torque or turn feedback signal from the top drive to the controller, wherein the controller uses the feedback signal to monitor at least one of either the torque or number of turns that are applied to the first tubular during the make-up process;

25        initiating a thread matching phase, which comprises the step of aligning a threaded portion of the first tubular for threading engagement with a threaded portion of the second tubular;

          initiating an initial threading phase, which comprises the steps of:

          setting a predetermined initial threading phase torque limit,

30        monitoring the amount of rotation of the first tubular, and

          monitoring the torque that is applied to the first tubular, wherein the initial threading phase is complete when the first tubular has been rotated by a predetermined

amount without exceeding the initial threading phase torque limit;

initiating a main threading phase, which comprises the steps of:

5 increasing the speed of rotation of the first tubular, and

increasing the initial threading phase torque limit to a main threading phase torque limit, wherein the main threading phase is complete when the controller detects a 10 decrease in the speed of rotation of the first tubular that is coupled with the torque that applied to the first tubular being near the main threading phase torque limit;

initiating a final threading phase, which comprises the steps of:

15 decreasing the increased speed of rotation that is applied to the first tubular, and

increasing the main threading phase torque limit to a final threading phase torque limit, wherein the final threading phase is complete when the final threading phase 20 torque limit has been reached; and

initiating a tightening phase, which comprises the steps of:

setting a final torque limit, and

incrementally increasing the final threading 25 phase torque limit until the final torque limit is reached, wherein the tightening phase is complete when the torque that is applied to the first tubular reaches the final torque limit and rotation ceases, and wherein the threaded connection between the tubulars is complete when the tightening phase is complete.

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21. The method of claim 20, further comprising the steps of:

obtaining torque versus turns data during the make-up process; and

analyzing the data to determine if the threaded connection is a proper connection.